

## STEINAKER RESERVOIR



### Introduction

Steinaker Reservoir is a large reservoir immediately north of Vernal in northeastern Utah. It is an off-stream impoundment of Ashley Creek, which drains the eastern High Uintas. The reservoir is built in a strike valley that has formed behind the resistant Dakota Sandstone. A state park at the reservoir provides year-round

recreational opportunities.

Steinaker Reservoir was created in 1961 by the construction of an earth-fill dam. The reservoir shoreline is entirely state owned, and public access is unrestricted. Reservoir water is used for irrigation (91%), and culinary (9%). If the urban growth takes place in Ashley Valley, the proportion used for culinary purposes is expected to increase.

#### Characteristics and Morphometry

Lake elevation (meters / feet)	1,682 / 5,520
Surface area (hectares / acres)	335.5 / 829
Watershed area (hectares / acres)	67,200 / 166,000
Volume (m <sup>3</sup> / acre-feet)	
capacity	49,833,000 / 40,400
conservation pool	0
Annual inflow (m <sup>3</sup> / acre-feet)	
Retention time (years)	
Drawdown (m <sup>3</sup> / acre-feet)	14,262,000 / 11,562
Depth (meters / feet)	
maximum	39.6 / 129.9
mean	14 / 45.9
Length (km / miles)	4.2 / 2.61
Width (km / miles)	.914 / .56
Shoreline (km / miles)	.885 / 5.5

#### Location

County	Uinta
Longitude / Latitude	109 31 52 / 40 30 58
USGS Map	Steinaker Reservoir, 1965
DeLorme's Utah Atlas & Gazetteer™	Page 56, C-3
Cataloging Unit	Ashley-Brush Creeks (16060002)

### Recreation

Steinaker Reservoir is easily accessible from US-191 about four miles north of Vernal. The highway follows the east shore for about a mile. An access road leads across the north end of the reservoir to the state park, which is on

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the west side of the lake.

Cross-country skiing, fishing, boating, swimming, camping, picnicking, ice fishing, and water skiing are all popular. Red Mountain and other foothill to the Uintas provide a backdrop.

Recreational facilities at the reservoir include Steinaker State Park. The state park has a concrete boat launch, modern rest rooms with showers, sewage disposal, sandy beaches, a 31 unit campground, and fish cleaning stations. Entrances are well marked.



There are numerous USFS campgrounds north of the reservoir along US-191. There are several private campgrounds nearby in Vernal (see info box).

### Watershed Description

Steinaker Reservoir is located at the edge of the Uinta Mountains, where the Precambrian granite that makes the Uintas is still buried by younger strata. The younger strata is tilted upwards towards the Uintas, and the harder layers have eroded to form cliffs (hogbacks) facing the mountains. Steinaker Reservoir is an impoundment of the strike valley behind the a hogback of Dakota Sandstone. The dam is at a point where a stream cut through the cliffs, allowing a large body of water to be impounded behind a small dam.

The natural watershed consists of the strike valley and drainage from Red Mountain. Ashley Creek, which also drains Dry Fork and Black Canyon Creek in the eastern High Uintas, is diverted into the reservoir via the Steinaker Feeder Canal.

The watershed high point, Marsh Peak, is 3,731 m (12,240 ft) above sea level, thereby developing a complex slope of 6.5% to the reservoir. The average stream gradient in the lower reaches of Ashley Creek is 2.3% (121 feet per mile), but is much steeper in the upper reaches of Ashley Creek and lower in the Steinaker Feeder Canal. The inflows are the Steinaker Feeder Canal and various washes along the west side and north

end of the reservoir. The outflow is the Steinaker Service Canal, which provides irrigation water to Ashley Valley.

The watershed is made up of high mountains, foothills, plateaus, badlands and valleys. The soil associations that compose the watershed are listed in Appendix III.

The vegetation communities consist of pine, spruce-fir, oak-maple, alpine tundra, pinyon-juniper, saltbrush, shadscale, greasewood and sagebrush-grass. The watershed receives 25 - 76 cm (10 - 30 inches) of precipitation annually. The frost-free season around the reservoir is 120 - 140 days per year.

According to the 1982 Clean Lakes Inventory, land use is as follows: multiple use--87% (grazing, recreation, and limited logging on National Forest lands, Agriculture--6.5% and private grazing and mining--6.5%.

### Limnological Assessment

The water quality of Steinaker Reservoir is very good. It is considered to be moderately hard with a hardness concentration value of approximately 142 mg/L (CaCO<sub>3</sub>). Those parameters that have exceeded State water quality

#### Limnological Data

Data averaged from STORET sites: 493755, 493756, 493757

<b>Surface Data</b>	<b>1979</b>	<b>1989</b>	<b>1991</b>
Trophic Status	M	O	M
Chlorophyll TSI	36.53	34.45	39.72
Secchi Depth TSI	37.50	43.34	47.26
Phosphorous TSI	53.20	27.23	34.01
Average TSI	42.41	35.01	40.33
Chlorophyll <i>a</i> (ug/L)	-	2.3	2.8
Transparency (m)	5	3.6	2.5
Total Phosphorous (mg/L)	17	10	11
pH	8.3	8.6	8.1
Total Susp. Solids (mg/L)	-	-	3
Total Volatile Solids (mg/L)	-	-	3
Total Residual Solids (mg/L)	-	-	1
Temperature (°C / °f)	20/68	20/68	21/70
Conductivity (umhos.cm)	190	359	197

#### Water Column Data

Ammonia (mg/L)	0.07	0.11	0.04
Nitrate/Nitrite (mg/L)	0.09	-	0.02
Hardness (mg/L)	157	-	126
Alkalinity (mg/L)	105	-	82
Silica (mg/L)	4.5	-	4.3
Total Phosphorous (ug/L)	24	40	18

#### Miscellaneous Data

Limiting Nutrient	N	P	N
DO (Mg/l) at 75% depth	0.3	0.2	1.9
Stratification (m)	11-15	5-7	9-13
Depth at Deepest Site (m)	22	14.5	22.0

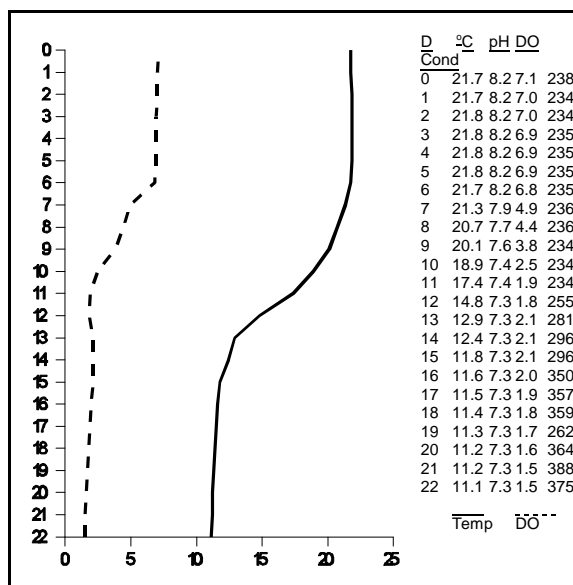
## LAKE REPORTS

standards for defined beneficial uses are total phosphorus and dissolved oxygen. Although the average concentrations of total phosphorus in the water column only exceeded the recommended pollution indicator for phosphorus of 25 ug/L in 1989 with a concentration of 40 mg/L, there were reported values much higher in the water column. The phosphorus concentration in the hypolimnion on August 15, 1991 reached a level of 137 ug/L. This increased concentration occurred when the reservoir was stratified and anoxic conditions were present near the bottom as indicated in the August 15, 1991 profile. Dissolved oxygen concentrations in late summer substantiate the fact that water quality impairments do exist. Concentrations dropped dramatically below the thermocline to approximately 1.5 mg/L. It is apparent that there is a high demand for oxygen at the sediment interface probably due to an accumulations of organic material.

The nitrogen/phosphorus data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir is mesotrophic even though it dropped into the oligotrophic range during 1989. The reservoir was stratified during a summer monitoring trip was on September 5, 1991 as indicated in the profile. The profile indicates that a thermocline developed at a depth of 10-12 meters. Consistent with the stratification was a noticeable decline in the concentration of dissolved oxygen in the water column. These conditions are deleterious to the fishery rendering approximately 1/2 of the water column unsuitable for a fishery. Winter data is not available to determine the extent of depletion, but should be obtained to evaluate impairments to the overwintering of fish.

In 1975 Steinaker Reservoir was one of the reservoirs evaluated under the NES survey. The survey indicated that the reservoir was mesotrophic with a lower than expected nutrient loading. The loading rates was 0.11 g/m<sup>2</sup> for phosphorus and 5.5 g/m<sup>2</sup> for total nitrogen. It was noted in the report that insufficient tributary and outlet sampling was conducted in relationship to these calculations. During the May sampling period *Chroomonas* sp. (52%) was the dominate phytoplankton populations while in August and September it was *Aphanocapsa* sp. (67% and 53% respectively).

According to DWR no fish kills have been reported in recent years. The reservoir supports populations of brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), and largemouth bass (*Micropterus salmoides*). The reservoir was treated for rough fish competition in 1989, so populations of native fishes may not be present in the reservoir.



The DWR stocks the reservoir with 50,000 - 75,000 fingerling rainbow trout annually. In 1990, 20,000 sub-catchable rainbow trout and 50,000 largemouth bass fry were also stocked.

Phytoplankton in the euphotic zone during the last study period include in order of dominance)

Species	Cell Volume (mm <sup>3</sup> /liter)	% Density By Volume
<i>Sphaerocystis schroeteri</i>	2.641	89.24
<i>Cosmarium</i> sp.	0.236	7.96
<i>Staurastrum gracile</i>	0.034	1.16
<i>Ankistrodesmus falcatus</i>	0.017	0.59
Pennate Diatoms	0.010	0.34
<i>Asterionella formosa</i>	0.009	0.32
<i>Oocystis</i> sp.	0.008	0.28
Centric Diatoms	0.003	0.11
Total	2.958	
Shannon-Weaver [H']	0.45	
Species Evenness	0.21	
Species Richness	0.32	

The phytoplankton community is dominated by the presence of green algae and desmids. This is indicative of good water quality and moderate production.

## Pollution Assessment

Nonpoint pollution sources include the following: sedimentation and nutrient loading from grazing; leachates, nutrients and sediments from mine sites that have not been reclaimed; sedimentation and increased

runoff from logging activities; and wastes and litter from recreation.

Grazing takes place throughout the watershed, but not in direct proximity of the reservoir.

Some of the heaviest logging in the Uinta Mountains takes place in this watershed, with large timber sales in the Oaks Park area. Much of the watershed has been logged in fairly recent history. Current logging practices leave buffer zones around riparian areas to mitigate impacts to water quality.

There are no active mines within the watershed, but old sites that have not been reclaimed likely leach some heavy metals and sediments into waterways, but water quality analysis in the reservoir has not documented any impairments from heavy metals.

There are no point sources of pollution in the watershed.

**Beneficial Use Classification**

The state beneficial use classifications include: culinary water (1A), recreational bathing (swimming) 2A, boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A) and agricultural uses (4).

Information	
<b>Management Agencies</b>	
Uinta Basin Association of Governments	722-4518
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
Uinta National Forest	377-5780
<b>Recreation</b>	
Dinosaurland Travel Region (Vernal)	789-6932
Vernal Chamber of Commerce	789-1352
Steinaker State Park	789-4432
Mammoth R.V. Park (Vernal)	789-9309
Campground Dina (Vernal)	789-2148
<b>Reservoir Administrators</b>	
Department of the Interior	-----
CUP	-----